



Emulex Drivers for Windows

FC version 2.70.014

User Manual

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Installation

Introduction

AutoPilot Installer® for Emulex® Storport Miniport drivers provides installation options from simple installations with a few mouse clicks to unattended installations that use predefined script files and text-only installations. AutoPilot Installer is included with Emulex drivers and utilities in Windows executable files (kit installers) that you can download from the Emulex website.

Each driver kit contains x86, x64 and IA64 Fibre Channel (FC) drivers.

Run the driver kit installer to extract the software needed for the driver installation.

You can install a driver by any of the following methods:

Note: These installation methods are not mutually exclusive.

Hardware-first installation. At least one Emulex adapter must be installed before you can install the Emulex drivers and utilities.

Software-first installation. You can install drivers and utilities using AutoPilot Installer prior to the installation of any adapters. You do not need to specify the adapter models to be installed later. The appropriate drivers and utilities automatically load when you install the adapters.

Text-Only installation. Text-based installation mode is used automatically when AutoPilot Installer is run on a Server Core system.

Network installation. You can place the driver kit installers on a shared network drive and install them across your local area network (LAN). Network-based installation is often used in conjunction with unattended installation and scripting. This allows you to configure and install the same driver version on all the hosts in a storage area network (SAN).

Unattended installation. You can run the driver kit installers and AutoPilot installer with no user interaction from a command line or script. Unattended installation works for both hardware-first and software-first installations and all driver kits. An unattended installation operates in silent mode (sometimes referred to as quiet mode) and creates an extensive report file with installation status.

Important Considerations

New in This Release

- This release supports Emulex 16-Gb HBAs.
- There are two types of utility kits: OneCommand Manager™ enterprise application includes a Graphical User Interface (GUI) and a Command Line Interface (CLI) and OneCommand Manager core application includes the CLI, but not the OneCommand application GUI. See the *OneCommand Manager Application Version 6.0 User Manual* for more information.

Minimum Software Requirements

AutoPilot Installer does not allow you to install the driver if the minimum Windows service pack or Microsoft Storport driver update is not installed.

Changing Driver Types

If you currently use a FC Port driver, the driver is replaced when you install the Emulex Storport Miniport FC driver. The FC driver is installed for all adapters on the server. You lose your customized driver parameters, persistent bindings, logical unit number (LUN) masking and LUN mapping. The default parameters set with AutoPilot Installer are usually the best options. However, you may want to note your current settings before you install the Emulex FC driver. After the installation, you can then update your customized driver parameters.

Note: This update process can leave files associated with old driver kits on your system. After running AutoPilot Installer and restarting your system, you may be required to uninstall old driver or utility program entries. Follow the procedures in “Uninstalling Emulex Driver Kits” on page 20. Ensure you delete only previous driver versions.

Storport Miniport Driver Information

Prerequisites

- One of the following operating systems must be installed:
 - Windows Server 2008 running on an x86, x64 or Itanium 64-bit server
 - Server Core installation option of Windows Server 2008 running on an x86 or x64 server
 - Windows Server 2008 R2 running on an x64 or Itanium¹ 64-bit server
 - Windows Server 2008 R2 SP1
 - Windows PE 2.x or 3.x¹
- Minimum 512 MB memory.

Note: Check the Emulex website for required updates to the Windows operating system or the Emulex drivers.

Compatibility

For a list of adapters that are compatible with this driver, see the driver's Downloads page on the Emulex website. For compatible firmware versions, see the Downloads page for the specific adapter.

Driver Kit Installer Overview

The driver kit installer is an executable file that self-extracts and copies the following software onto your system:

- FC Protocol drivers - Manages communication and data transfer between applications and I/O devices, using Emulex adapters as agents.
- ElxPlus driver - Supports the OneCommand Manager[™] application, persistent binding and LUN mapping and masking.

If you are creating Windows PE disk images and/or performing boot from SAN installation, you must select the **Unpack All Drivers** option instead of running AutoPilot Installer. See step 2 of Installing the Driver Kit in the following procedure.

1. AutoPilot Installer is not supported for use with Windows PE. See the Windows Automated Installation Kit (WAIK) documentation for instructions on including drivers with your Windows PE images.

After the driver kit is installed, you have two options:

- Automatically run AutoPilot Installer immediately. This is the default option. See Option 1 on page 4 for more information.
- Explicitly run AutoPilot Installer later on your system. See Option 2 on page 4 for more information.

Installing the Driver Kit

To install the driver kit:

1. Download the driver kit installer from the Emulex website to your system.

Note: The name of the driver kit installer depends on the current version identifier.

2. If you plan to create Windows Preinstallation Environment (PE) disk images and/or perform boot from SAN installations, unpack all drivers. On the driver kit installer Welcome page, select the **Unpack all drivers** checkbox. Checking this checkbox unpacks all the drivers into the 'My Documents' directory.
3. Choose one of three options:
 - For an automatic interactive installation, see "Option 1: Automatically Run AutoPilot Installer" on page 4.
 - For control of all interactive installation settings, see "Option 2: Run AutoPilot Installer Separately" on page 4.
 - For an unattended installation with AutoPilot Installer, see "Performing an Unattended Driver Installation" on page 7.

Text-Only Driver Installation

Text-based installation mode is used automatically when the driver kit installer runs on a server with the Server Core installation option of Windows Server. During text-based installations, AutoPilot Installer uses a command prompt window. The driver kit installer notifies you when the driver is installed and also gives you a chance to stop the installation. Whether it is launched from the command line or started programmatically, Windows always starts AutoPilot Installer as a separate stand-alone task. This means that AutoPilot Installer has its own command prompt window and cannot access others.

AutoPilot Installer Overview

AutoPilot Installer runs after the driver kit and the OneCommand Manager application are installed. AutoPilot Installer can be run by:

- Continuing the installation process after the driver kit installation is completed.
- Interactive installation at a later time.
- Unattended installation.

AutoPilot Installer Features

- Command line functionality - Initiates an installation from a command prompt or script. Configuration settings can be specified in the command line.
- Compatibility verification - Verifies that the driver to be installed is compatible with the operating system and platform.
- Driver installation and update functionality - Installs and updates drivers.
- Multiple adapter installation capability - Installs drivers on multiple adapters, alleviating the need to manually install the same driver on all adapters in the system.
- Driver diagnostics - Determines whether the driver is operating properly.
- Silent installation mode - Suppresses all screen output (necessary for unattended installation).

Starting Installers from a Command Prompt or Script

When a driver kit installer or AutoPilot Installer is run from a command prompt or command script (batch file), the Windows command processor does not wait for the installer to run to completion. Thus you cannot check the exit code of the installer before the next command is executed. Emulex recommends that command line invocation always use the “start” command with the “/wait” option. This causes the command processor to wait for the installer to finish before it continues.

Running a Software Installation Interactively

There are two options when performing an installation interactively. These options assume you have already downloaded the driver kit installer from the Emulex website.

Option 1: Automatically Run AutoPilot Installer

Use this option unless you have specific configuration needs. This option allows you to complete a driver kit installation and AutoPilot installation with a few mouse clicks.

1. Double-click the driver kit installer or run it from a command line. See “AutoPilot Installer Command Line and Configuration File Parameters” on page 8 for information on the command line options. The command line parameter APargs allows you to specify arguments that are automatically passed to the AutoPilot Installer command. A Welcome page is displayed with driver kit version information and Emulex contact information.
2. Click **Next** to proceed to the Installation Options page.
For each installation option, the default installation location for that option is displayed. Browse to a different location, if desired.
3. Click **Install** to continue the installation.
The Progress dialog box is displayed. After all tasks are completed, a Finish page is displayed. The Start AutoPilot Installer box is automatically selected.
4. Click **Finish**. AutoPilot Installer is run automatically.

Option 2: Run AutoPilot Installer Separately

This option is recommended to:

- Change installation settings for a limited number of systems.
- Familiarize yourself with AutoPilot Installer configuration options.

To access these features, run AutoPilot Installer after driver kit installation is complete. This allows you to change the configuration options supplied to AutoPilot Installer (see below).

1. Perform steps 1 through 3 for Option 1.
2. Clear the **Run AutoPilot Installer** check box on the Finish page.
3. Click **Finish**. The driver kit installer exits.

After the driver kit installation is complete, change the configuration in one of two ways:

- Change the configuration file. See “Software Configuration Parameters” on page 10 for details.
- Supply parameters on the command line. See “AutoPilot Installer Command Line and Configuration File Parameters” on page 8 for details.

Once you have finished this step, you can run AutoPilot Installer at a later time, using either of the following methods: (If you are supplying options via the command line, you must run AutoPilot Installer from the command line.)

- Select **Programs>Emulex>AutoPilot Installer** in the Start menu.
- Run AutoPilot Installer from the command line. Type:

```
C:\Program Files\Emulex\AutoPilot Installer\APInstall.exe
```

Note: The location of APInstaller.exe may differ on your system, depending on your system's Program Files location. You may also specify a different location when you install the driver package.

Hardware-First Installation or Driver Update

The driver kit installer must be downloaded from the Emulex website and installed.

To perform a hardware-first installation:

1. Install a new Emulex adapter and power-on the system. If the Windows Found New Hardware wizard is displayed, click **Cancel** to exit. AutoPilot Installer performs this function.

Note: If there are multiple adapters in the system, the Windows Found New Hardware wizard appears multiple times. Click **Cancel** to exit the wizard each time it appears.

2. Run AutoPilot Installer using one of the two options listed in **Running a Software Installation Interactively** beginning on page 4.
3. When the AutoPilot Installer Welcome page appears, select an adapter in the list and click **Next**. The installation continues. Consider the following:
 - If you are replacing a SCSIport Miniport or FC Port driver, an Available Drivers list is displayed. Click **OK** on this window.
 - If you are updating the driver, the existing port settings are used, unless otherwise specified in the configuration file. These settings are pre-selected but can be changed. Set or change settings, then click **Next**.
 - If you are initially installing a vendor-specific version of the Emulex driver installation program, a Driver Configuration page may be displayed. This page includes one or more windows with questions that you must answer before continuing the installation process. In this case, answer each question and click **Next** on each window to continue.
4. Click **Next**. The installation automatically continues to completion. A dialog box is displayed if Windows requires a reboot. View the progress of the installation. Once the installation is successful, a Finish page appears.

5. View or print a report, if desired.
 - View Installation Report - The installation report is a text file with current Emulex adapter inventory, configuration information and task results.
 - Print Installation Report - The Windows print dialog is displayed to select options for printing the installation report.
6. Click **Finish** to exit AutoPilot Installer. If the system must be rebooted, you are prompted to do so as indicated in step 4; you must reboot before using the drivers or utilities.

Software-First Installation

The driver kit installer must be downloaded from the Emulex website and installed.

To perform a software-first installation:

1. Run AutoPilot Installer using one of the two options listed in **Running a Software Installation Interactively** beginning on page 4. The following message appears:

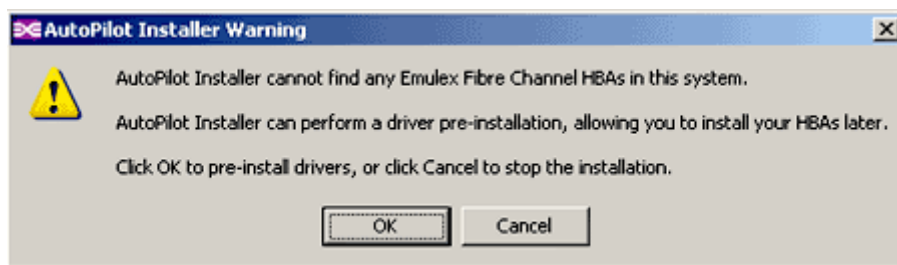


Figure 1: AutoPilot Installer Warning (Software-First Installation)

2. Click **OK**. A Welcome page appears.
3. Click **Next**. The installation automatically progresses. View the progress of the installation. Once the installation is completed successfully, a Finish Page appears.
4. View or print a report, if desired.
 - View Installation Report - The installation report is a text file with current Emulex adapter inventory, configuration information and task results.
 - Print Installation Report - The Windows print dialog is displayed to select options for printing the installation report.
5. Click **Finish** to exit AutoPilot Installer.

Diagnostics

Once the AutoPilot Installer is finished, the Finish page is displayed.

If the installation fails, the Diagnostics window shows that the adapter failed. If the adapter fails:

1. Select the adapter to view the reason for the failure. The reason and suggested corrective action are displayed.
2. Perform the suggested corrective action and run AutoPilot Installer again.

Note: You can run AutoPilot Installer again from the Start menu (**Programs>Emulex>AutoPilot Installer**) or you can run APInstall.exe from a command prompt.

Performing an Unattended Driver Installation

An unattended driver installation, sometimes referred to as a quiet or silent installation, requires no user input. This is useful for performing an installation remotely from a command script, or when you want to make sure a custom configuration is not changed by a user during installation. There are two ways to perform an unattended installation. These correspond to the options for running the software installation interactively.

Option 1: Install the driver silently

Run the driver kit installer from a command prompt or script. Specify the “/q” (quiet) command line option. For example:

```
elxdrv-fc<version>.exe /q
```

Note: The name of the driver kit installer depends on the current version identifier. For other command line options, see “AutoPilot Installer Command Line and Configuration File Parameters” on page 8.

Option 2: Run the driver kit installer separately

1. Follow steps 1 - 3 for “Running a Software Installation Interactively” on page 4.
2. Clear the **Run AutoPilot Installer** check box on the Finish page.
3. Choose one of the following options:
 - Run the AutoPilot Installer from a command prompt or script with the silent option:
`APInstall.exe /silent`
 - Edit the AutoPilot Installer configuration file before running the AutoPilot Installer. The configuration file is typically located in:
`C:\Program Files\Emulex\AutoPilot Installer\APInstall.cfg`

Uncomment the line that sets SilentInstallEnable to “True”. There are other settings in the same section of the configuration file related to unattended installations that you may also want to edit. See “Software Configuration Parameters” on page 10 for more information. After editing the file, you can run the AutoPilot Installer from the Start menu, a command prompt or a script.

AutoPilot Installer Process in Unattended Installation Mode

When in unattended installation mode, AutoPilot Installer does the following:

- Reads the configuration file.
- Reads any options that may be specified on the command line, overriding the configuration file settings as appropriate.
- Opens the installation report file.
- Validates the operating system.
- Discovers adapters and records the adapter inventory in the report file.
- Verifies mandatory configuration file parameters.
- Searches for drivers to install based on the LocalDriverLocation setting in the configuration file.
- If appropriate, verifies that the selected driver is a different type than the currently installed driver, or a more recent version of the currently installed driver.
- Copies the driver parameters from the configuration file into the registry for the driver's coinstaller.
- Installs/updates the driver.

- Rediscovered adapters and records the updated adapter inventory in the report file.
- Records the final results and closes the report file.

AutoPilot Installer Command Line and Configuration File Parameters

You can pass command line parameters to the AutoPilot Installer, yet still have it run automatically by the driver kit, if you run the driver kit installer from a command prompt or script.

If you specify the “/q” switch with the driver kit installer command, the driver kit installer runs in unattended mode and automatically invokes the APInstall.exe with its “/silent” switch. See the “Performing an Unattended Driver Installation” on page 7 for more information.

The AParg Driver Kit Parameter and Appending to the APInstall.exe File

If you specify a value for the “APargs” driver kit parameter, this value is appended to the APInstall.exe command line. For example, if you execute this installer file as:

```
elxdrv-fc<version>.exe /q APargs=SilentRebootEnable=True
```

then after installing the AutoPilot Installer, the driver kit automatically executes it as:

```
APInstall.exe /silent SilentRebootEnable=True
```

To specify more than one parameter, separate the settings by one or more spaces and put quotes around the entire APargs expression. For example, the command line (all on one line)

```
elxdrv-fc<version>.exe "APargs=SilentRebootEnable=True localDriverLocation = "d:\drivers\new\Storport" "
```

results in the AutoPilot Installer being run as:

```
APInstall.exe SilentRebootEnable=True localDriverLocation = "d:\drivers\new\Storport"
```

Parameter values that contain spaces, such as path names, must be enclosed in quotes. To add such a setting to APargs, you must insert backslashes before the quotes around the value, and then add quotes around the entire APargs expression. For example, the command line (all on one line)

```
elxdrv-fc<version>.exe "APargs=ReportLocation=\"C:\Documents and Settings\Administrator\My Documents\reports\" "
```

results in AutoPilot Installer being run as:

```
APInstall.exe ReportLocation="C:\Documents and Settings\Administrator\My Documents\reports"
```

If you have many parameters to pass to the AutoPilot Installer, or if you want to do so repeatedly, then it may be less error prone to run the utility kit installer interactively, delay AutoPilot Installer execution, and then run the AutoPilot Installer command yourself. The procedure for doing so is described in “Option 2: Run AutoPilot Installer Separately” on page 4 and “Performing an Unattended Driver Installation” on page 7.

You can specify a non-default directory for the driver kit by specifying an 'installation folder' on the command line. For example:

```
elxdrv-fc<version>.exe install:"C:\Emulex"
```

This option can be used in conjunction with the 'APargs' directive.

AutoPilot Installer Syntax

The syntax used to run AutoPilot Installer silently from a command line or script is:

```
APIInstall [/silent] [parameter setting][parameter setting...]
```

The “silent” switch and parameter settings can occur in any order. One or more spaces must separate the switch and each parameter setting.

The syntax of a parameter setting is

```
parameter_name =["]value["]
```

Double quotes are required only around values that contain spaces. Spaces may separate parameters, equal signs and values. Parameter names and values are not case-sensitive.

The APIInstall command may contain the settings listed below. Each setting, except ConfigFileLocation, may also be specified in the AutoPilot Configuration file. For descriptions of each parameter, see “Software Configuration Parameters” on page 10.

Settings specified in the APIInstall command override those specified in the configuration file.

```
ConfigFileLocation = path-specifier
NoSoftwareFirstInstalls = { TRUE | FALSE }
SilentRebootEnable = { TRUE | FALSE }
ForceDriverUpdate = { TRUE | FALSE }
ForceDriverTypeChange = { TRUE | FALSE }
SkipDriverInstall = { TRUE | FALSE }
InstallWithoutQFE = { TRUE | FALSE }
ForceRegUpdate = { TRUE | FALSE }
LocalDriverLocation = path-specifier
ReportLocation = path-specifier
```

Path Specifiers

Paths may be specified as

- an explicit path:

```
ReportLocation="C:\Program Files\Emulex\AutoPilot Installer\Reports"
```
- a relative path:

```
LocalDriverLocation="Drivers\Storport Miniport\"
```

(assuming installation into “C:\Program Files\Emulex\AutoPilot Installer\”, this path would logically become “C:\Program Files\Emulex\AutoPilot Installer\Drivers\Storport Miniport\”)
- with the %ProgramFiles% environment variable:

```
LocalDriverLocation = "%ProgramFiles%\Emulex\AutoPilot Installer\Driver"
```

Configuration File Location

The optional setting ConfigFileLocation contains the path to the configuration file that should be used. If this parameter is not specified, AutoPilot Installer uses the file named APIInstall.cfg in the same folder as APIInstall.exe.

The format is the same as that of the other path settings.

Example

```
APIInstall /silent SkipDriverInstall=True configFileLocation=MyConfiguration.cfg
```

Software Configuration Parameters

DiagEnable (Running Diagnostics)

Note: The DiagEnable parameter cannot be specified on the command line; it must be specified within the configuration file.

Default: True

By default, AutoPilot Installer runs its diagnostics after all driver installation tasks have been completed. To disable this function, set this parameter to false.

ForceDriverTypeChange (Forcing a Driver Type Change)

Default: False

When installing a driver, set this parameter to true to cause silent mode installations to update/install the Storport Miniport driver on each adapter in the system, without regard for the currently installed driver type (replacing any installation of the SCSIport Miniport or FC Port driver).

ForceDriverUpdate (Forcing a Driver Version Update)

Default: False

By default, if the same version of the driver is already installed, an unattended installation proceeds with installing only the utilities. To force a driver update even if the same version of the driver is installed, set this parameter to true.

Note: ForceDriverUpdate applies to unattended installations only; in interactive installations this parameter is ignored. Instead you are asked if the driver should be updated.

ForceRegUpdate (Forcing Updates of an Existing Driver Parameter Value)

Default: False

The ForceRegUpdate driver parameter setting determines whether existing driver parameters are retained or changed when you update the driver. By default, all existing driver parameter settings are retained. The ForceRegUpdate parameter does not affect any existing persistent bindings. To set up an installation to remove the existing driver parameters from the registry and replace them with parameters specified in the AutoPilot Configuration file, set this parameter to true.

Note: You can use this setting for attended installations with the AutoPilot Installer wizard if you modify the AutoPilot Configuration file in an AutoPilot Installer Kit.

LocalDriverLocation (Specifying Location to Search for Drivers)

Default: Drivers (The default "Drivers" folder is located in the same folder as AutoPilot Installer.)

You can specify a local location that is to be searched for drivers during unattended installations. The location may be a local hard drive or a network share. Removable media are not searched. Example:

`LocalDriverLocation = "d:\drivers\new\Storport"`

NoSoftwareFirstInstalls (Prohibiting Software First Installations)

Default: False

When this parameter is set to true, AutoPilot Installer prevents unattended installations from performing software-first installations. This way you can execute an automated installation on multiple machines in your network, but only machines with Emulex adapters actually have Emulex drivers updated or installed.

If this parameter is omitted from the configuration file or explicitly set to true, the page is not displayed. AutoPilot Installer uses configuration file parameters to determine the appropriate management mode.

ReportLocation (Setting Up an Installation Report Title and Location)

The automatically generated file name for this report is

```
"report_mm-dd-yy.txt"
```

where 'mm' is the month *number*, 'dd' is the day, and 'yy' indicates the year.

You can change only the installation report folder; the file name is auto-generated. In the following example x could be any available drive:

```
ReportLocation = "x:\autopilot\reports\installs\"
```

SilentInstallEnable (Enabling Unattended Installation)

Note: Setting the SilentInstallEnable parameter to true in the configuration file is functionally equivalent to supplying the "/silent" switch on the command line. You cannot specify the SilentInstallEnable parameter on the command line.

Default: False

Setting this parameter to true causes AutoPilot Installer to operate with no user interaction.

SilentRebootEnable (Enabling Silent Reboot)

Default: False

AutoPilot Installer's default behavior in unattended installations is not to restart the system. AutoPilot Installer continues with the installation. Restarts often require you to log in as part of the Windows start up process. If there is no login, the installation process would hang if the system is restarted. However, Windows can be configured to start up without requiring you to log in. You must make sure it is safe to restart the system during unattended installations if you are going to set this parameter to true.

InstallWithoutQFE (Enabling Installation if a QFE Check Fails)

Default: False

AutoPilot Installer checks for Microsoft's Quick Fix Engineering updates (QFEs), also known as KB (Knowledge Base) updates, based on the checks you have specified in the [STORPORT.QFES] section. By default, the installation terminates if the QFE check fails. To enable a driver installation to proceed even if a check for QFEs fails, set this parameter to true.

AutoPilot Configuration File

The AutoPilot configuration file is organized into sections, grouped according to related commands. There are six main sections. Each section begins with a heading. The heading is required even if there are no settings in the section. The only section not required is the Installation Prompts section, which has the heading [STORPORT.CONFIGURATION]. That section cannot exist if AutoPilot Installer runs in silent mode. You must delete or comment-out that entire section for unattended installation.

Lines that begin with a semicolon are comments. Some of the comments are sample settings. To use the setting, remove the semicolon.

Using the Windows Environment Variable (%ProgramFiles%)

You can use the Windows ProgramFiles environment variable in the LocalDriverLocation and ReportLocation strings within the configuration file. This allows you to specify strings in a driver-independent manner, allowing the same configuration file to be used on different systems where Windows may have been installed on different drives. To use this option, "%ProgramFiles%" must be the first component specified in the string. The portion of the string that follows is appended to the contents of the ProgramFiles environment variable. For example:

```
ReportLocation = "%ProgramFiles%\my company\reports".
```

Note: The contents of the ProgramFiles environment variable is not terminated with a slash, so you must provide one in the string. Windows environment variables are not case-sensitive.

Configuration Identification [AUTOPILOT.ID]

This section appears at the beginning of every AutoPilot configuration file and contains revision and label information. The revision entry identifies the file's version number and the date on which it was produced. The label entry is used to identify the configuration that the file supports. This section may appear only once in the APInstall.cfg file.

Software Configuration [AUTOPILOT.CONFIG]

This section can contain settings that control and configure AutoPilot Installer and the OneCommand Manager application operation. This section can appear only once in the AutoPilot configuration file. See "Software Configuration Parameters" on page 10 for information about settings that may be specified in this section.

Configuration Prompts/Vendor-Specific Questions [STORPORT.CONFIGURATION]

Note: You must remove or comment out the entire [STORPORT.CONFIGURATION] section for an unattended installation.

A [STORPORT.CONFIGURATION] section may exist in the AutoPilot configuration file. The first items in this section are the driver parameters to be used regardless of how the questions are answered. This is followed by a subsection that contains questions (these may be vendor-specific questions). A line containing '[QUESTIONS]' marks the start of the subsection, and the end of it is marked by a line containing '[ENDQUESTIONS]'. Within the question subsection there can be as many questions as needed. Each question uses the format:

```
question= "question?", "explanation", "answer0", "answer1", "answer2",.... , "answerN"
```

Where:

"question?" contains the text of the question to be asked.

"*explanation*" contains brief text to help explain the question. The explanation appears below the question in a smaller font. If there is no explanatory text, empty quotes must be used in its place.

"*answer0*" contains the 1st answer to be displayed in the drop down list.

"*answer1*" contains the 2nd answer to be displayed in the drop down list.

"*answern*" contains the *n*th answer to be displayed in the drop down list.

For each question there can be as many answers as needed. For each answer there must be a corresponding "answer =" section with its corresponding driver parameters listed beneath it. The answer uses the format:

```
answer = 0
    DriverParameter="Param1=value; Param2=value;"
answer = 1
    DriverParameter="Param1=value; Param2=value;"
....
answer = n
    DriverParameter="Param1=value; Param2=value;"
```

Example of [STORPORT.CONFIGURATION] section:

```
[STORPORT.CONFIGURATION]
;The first section contains the driver parameters common to all configurations, no
matter what answers are given.
    DriverParameter="EmulexOption=0;"
[QUESTIONS]
    question = "What is your link speed?", "Note: select 'Auto-detect' if you are
unsure about the answer.", "4GB", "2GB", "1GB", "Auto-detect"
        ANSWER = 0
            DriverParameter = "LinkSpeed=4;" ;4 GB
        ANSWER = 1
            DriverParameter = "LinkSpeed=2;" ;2 GB
        ANSWER = 2
            DriverParameter = "LinkSpeed=1;" ;1 GB
        ANSWER = 3
            DriverParameter = "LinkSpeed=0;" ;Auto-detect
    question = "Describe the topology of your storage network.", "Note: Select 'Arbitrated Loop' when directly
connected to the array (no fibre switch). Select 'Point-to-Point' when connected to a
SAN (fibre switch).", "Arbitrated Loop", "Point-to-Point"
        ANSWER = 0
            DriverParameter = "Topology=2;"
        ANSWER = 1
            DriverParameter = "Topology=3;"
[ENDQUESTIONS]
[END.STORPORT.CONFIGURATION]
```

QFE Checks [STORPORT.QFES]

This section specifies an additional Quick-Fix Engineering (QFE) check, also known as KB (Knowledge Base) updates, during installation. To add a Windows QFE check to the configuration file, edit the [STORPORT.QFES] section in the AutoPilot configuration file. You may place this section anywhere within the file as long as it is not contained within another section. This section contains a single line for each QFE that is to be checked. Up to 10 lines are checked, more than that may exist but they are ignored. All parameters in each line must be specified. These lines have the format

qfe = "qfe name", "path and file name", "file version", "applicable OS"

qfe name - The name of the item being checked. For example, QFE 838896. The name should facilitate searching Microsoft's website for any required code updates.

path and file name - This string identifies the file to be checked and its location relative to the Windows home folder. In most cases, the file to check is the Microsoft Storport driver, for example, "\system32\drivers\storport.sys". This string is also used in dialogs and log file messages.

file version - This is the minimum version that the file to be checked must have for the QFE to be considered installed. It is specified as a text string using the same format as is used when displaying the files property sheet. For example, "5.2.1390.176".

applicable OS - This is used to determine if the QFE applies to the operating system platform present. The acceptable values are "Win2003" and "Win2008".

For example

```
[STORPORT.QFES]
```

```
qfe = "QFE 83896", "\system32\drivers\storport.sys", "5.2.1390.176", "Win2003"
```

Setting Up FC Driver Parameters [STORPORT.PARAMS]

This section specifies driver parameters. Parameters are read exactly as they are entered and are written to the registry. To change driver parameters, modify this section of the AutoPilot configuration file. Locate the [STORPORT.PARAMS] section in the AutoPilot configuration file. This section follows Optional Configuration File Changes. Under the [STORPORT.PARAMS] heading, list the driver parameters and new values for the driver to use.

For example:

```
Driver Parameter = "LinkTimeout = 45"
```

See "Storport Miniport Driver Parameters" on page 24 for a listing of driver parameters, defaults and valid values.

Setting Up System Parameters [SYSTEM.PARAMS]

To change the system parameters, create a [SYSTEM.PARAMS] section in the APInstall.cfg file. Create this section under the Optional Configuration File Changes heading in the [AUTOPILOT.CONFIG] section.

For example, you can adjust the operating system's global disk timeout. The timeout is stored in the registry under the key HKML\CurrentControlSet\Services\disk and is specified with the following string:

```
TimeOutValue = 0x3C (where the number is the timeout value in seconds.)
```

AutoPilot Installer Exit Codes

AutoPilot Installer sets an exit code to indicate whether an installation was successful or an error occurred. These exit codes allow AutoPilot Installer to be used in scripts with error handling. In unattended installations, AutoPilot Installer sets the following exit codes:

Table 1: Unattended Installation Error Codes

Error Code	Hex	Description
0	0x00000000	No errors.
2399141889	0x8F000001	Unsupported operating system detected.
2399141890	0x8F000002	The AutoPilot Configuration file is not found.
2399141891	0x8F000003	Disabled adapters detected in the system.

Table 1: Unattended Installation Error Codes (Continued)

Error Code	Hex	Description
2399141892	0x8F000004	The selected driver is 64-bit and this system is 32-bit.
2399141893	0x8F000005	The selected driver is 32-bit and this system is 64-bit.
2399141894	0x8F000006	Installation activity is pending. AutoPilot Installer cannot run until it is resolved.
2399141895	0x8F000007	(GUI Mode only) You cancelled execution because you did not wish to perform a software-first install.
2399141896	0x8F000008	No drivers found.
2399141897	0x8F000009	One or more adapters failed diagnostics.
2399141904	0x8F000010	(GUI Mode only) You chose to install drivers even though a recommended QFE or Service Pack was not installed.
2399141920	0x8F000020	(GUI Mode only) You chose to stop installation because a recommended QFE or Service Pack was not installed.
2399141899	0x8F00000B	Unattended installation did not find any drivers of the type specified in the config file.
2399141900	0x8F00000C	A silent reboot was attempted, but according to the operating system a reboot is not possible.
2399141901	0x8F00000D	(GUI Mode only) A driver package download was cancelled.
2399141902	0x8F00000E	(Non-Enterprise) No adapters were found in the system.
2399141903	0x8F00000F	A required QFE or Service Pack was not detected on the system.
2399141836	0x8F000030	AutoPilot Installer was not invoked from an account with Administrator-level privileges.
2391419952	0x8F000040	AutoPilot Installer has detected unsupported adapters on the system.
2399141968	0x8F000050	Unattended software-first installations are disallowed.
2399141984	0x8F000060	You cancelled APInstall before any driver/utility installation occurred.
2399142000	0x8F000070	You cancelled APInstall after driver/utility installation occurred.
2399142032	0x8F000090	APInstaller encountered an error while parsing the command line (Report file contains details).

AutoPilot Installer Installation Reports

During each installation, AutoPilot Installer produces a report describing events that occurred during the installation. This report has several sections.

- The first section provides basic information including the time and date of the installation, the name of the machine that the installation was performed on, the version number of AutoPilot Installer, and the identification of the configuration file that was used.
- The second section provides an inventory of the Emulex adapters as they were before AutoPilot Installer performed any actions.
- The third section lists the tasks that AutoPilot performs in the order they are done.
- The fourth section records the results of each task. When all driver installation tasks are completed, an updated adapter inventory is recorded.

Note: If you cancel AutoPilot Installer, that fact is recorded along with when you cancelled the installation. The contents of any error dialogs that are displayed are also recorded.

Command Script Example

Modify the configuration file to script the installation of a system's driver. The following example command script (batch file) assumes that you have made mandatory changes to the AutoPilot configuration file, as well as any desired optional changes. If your systems were set up with a service that supports remote execution, then you can create a command script to remotely update drivers for all of the systems on the storage net. If Microsoft's Remote Command Service (RCMD) service was installed, for example, a script similar to the following would run remote execution:

```
rcmd \\server1 g:\autopilot\x86_full_kit\apinstall
if errorlevel 1 goto serverlok
echo AutoPilot reported an error upgrading Server 1.
if not errorlevel 2147483650 goto unsupported
    echo Configuration file missing.
goto serverlok
:unsupported
if not errorlevel 2147483649 goto older
echo Unsupported operating system detected.
:older
if not errorlevel 2001 goto none
    echo The driver found is the same or older than the existing driver.
    goto serverlok
:none
if not errorlevel 1248 goto noreport
    echo No Emulex adapter found.
goto serverlok
:noreport
if not errorlevel 110 goto nocfg
    echo Could not open installation report file.
goto serverlok
:nocfg
if not errorlevel 87 goto badcfg
    echo Invalid configuration file parameters.
    goto serverlok
:badcfg
if not errorlevel 2 goto serverlok
    echo No appropriate driver found.
serverlok
rcmd \\server2 g:\autopilot\ApInstall ConfigFileLocation=g:\autopilot\mysetup\apin-
stall.cfg
if errorlevel 1 goto server2ok
echo AutoPilot reported an error upgrading Server 2.
if not errorlevel 2147483650 goto unsupported
    echo Configuration file missing.
goto server2ok
:unsupported
if not errorlevel 2147483649 goto older
    echo Unsupported operating system detected.
:older2
if not errorlevel 2001 goto none2
    echo The driver found is the same or older than the existing driver.
    goto server2ok
:none2
if not errorlevel 1248 goto noreport2
```

```
    echo No adapter found.
goto server2ok
:noreport
    if not errorlevel 110 goto nocfg2
    echo Could not open installation report file.
goto server2ok
:nocfg2
    if not errorlevel 87 goto badcfg2
    echo Invalid configuration file parameters.
goto server2ok
:badcfg2
    if not errorlevel 2 goto server2ok
    echo No appropriate driver found.
server2ok
```

Manual Installation and Updating Procedures

Manually Installing or Updating the Emulex Drivers

Overview

You can install or update the Emulex drivers and utilities manually without using AutoPilot Installer.

The Emulex PLUS (ElxPlus) driver supports the OneCommand Manager application, persistent binding and LUN mapping and masking.

Removing the Adjunct Driver Registry Key

The ElxPlus driver replaces the adjunct driver that was used with Storport Miniport 1.11a3 or earlier. If it is currently installed, the adjunct driver registry key must be removed using the deladjct.reg file before you install the ElxPlus driver.

Installing the Emulex PLUS (ElxPlus) Driver for the First Time

To install the ElxPlus driver from the desktop:

Note: Only one instance of the ElxPlus driver should be installed, even if you have multiple adapter ports installed in your system.

1. Run the driver kit installer, but do not run AutoPilot Installer. See “Running a Software Installation Interactively” on page 4 for instructions on how to do this.
2. Select **Start>Settings>Control Panel>Add Hardware**. The Add Hardware Wizard window appears. Click **Next**.
3. Select **Yes, I have already connected the hardware** and click **Next**.
4. Select, **Add a new hardware device** and click **Next**.
5. Select **Install the hardware that I manually select from a list (Advanced)** and click **Next**.
6. Select **Show All Devices** and click **Next**.
7. Click **Have Disk....** Direct the Device Wizard to the location of elxplus.inf. If you have installed the driver installer kit in the default folder and C:\ is your Windows system drive, the path is:
 - C:\Program Files\Emulex\AutoPilot Installer\Drivers\Storport\x86\HBA for the 32-bit driver version

or

- C:\Program Files\Emulex\AutoPilot Installer\Drivers\Storport\x64\HBA for the x64 driver version
 - or
 - C:\Program Files\Emulex\AutoPilot Installer\Drivers\Storport\IA64\HBA for the Itanium driver version
8. Click **OK**.
 9. Select **Emulex PLUS**. Click **Next** and click **Next** again to install the driver.
 10. Click **Finish**. The initial ElxPlus driver installation is complete. Continue with manual installation of the Storport Miniport Driver. See “Installing or Updating the FC Storport Miniport Driver” on page 19 for this procedure.

Updating the Emulex PLUS (ElxPlus) Driver

To update an existing ElxPlus driver from the desktop:

Note: Only one instance of the ElxPlus driver should be installed, even if you have multiple adapter ports installed in your system.

1. Run the driver kit installer, but do not run AutoPilot Installer. See “Running a Software Installation Interactively” on page 4 for instructions on how to do this.
2. Select **Start>Settings>Control Panel>Administrative Tools>Computer Management**.
3. Click **Device Manager** (left pane).
4. Click the plus sign (+) next to the Emulex PLUS class (right pane) to show the ElxPlus driver entry.
5. Right-click the ElxPlus driver entry and select **Update Driver...** from the menu.
6. Select **No, not this time**. Click **Next** on the **Welcome to the Hardware Update Wizard** window. Click **Next**.
7. Select **Install from a list or specific location (Advanced)** and click **Next**.
8. Select **Don't Search. I will choose the driver to install**.
9. Click **Have Disk...** Direct the Device Wizard to the location of driver's distribution kit. If you have installed the driver installer kit in the default folder, the path is:
 - C:\Program Files\Emulex\AutoPilot Installer\Drivers\Storport\x86 for the 32-bit driver version
 - or
 - C:\Program Files\Emulex\AutoPilot Installer\Drivers\Storport\x64 for the x64 driver version
 - or
 - C:\Program Files\Emulex\AutoPilot Installer\Drivers\Storport\IA64 for the Itanium driver version
10. Click **OK**. Select **Emulex PLUS**.
11. Click **Next** to install the driver.
12. Click **Finish**. The ElxPlus driver update is complete. Continue with manual installation of the Storport Miniport Driver.

Installing or Updating the FC Storport Miniport Driver

To update or install the FC Storport Miniport driver from the desktop:

1. Select **Start>Settings>Control Panel>System**.
2. Select the **Hardware** tab.
3. Click **Device Manager**.
4. Open the "SCSI and RAID Controllers" item.
5. Double-click the desired Emulex adapter.

Note: The driver affects only the selected adapter. If there are other adapters in the system, you must repeat this process for each adapter. All dual-channel adapter models are displayed in Device Manager as two adapters, therefore each adapter must be updated.

6. Select the **Driver** tab.
7. Click **Update Driver**. The Update Driver wizard starts.
8. Select **No, not this time**. Click **Next** on the Welcome to the Hardware Update Wizard window.
9. Select **Install from a list or specific location (Advanced)** and click **Next**.
10. Select **Don't search. I will choose the driver to install** and click **Next**.

Note: Using the OEMSETUP.INF file to update Emulex's FC Storport Miniport driver overwrites customized driver settings. If you are upgrading from a previous installation, write down the settings. Following installation, use the OneCommand Manager application to restore the pre-upgrade settings.

11. Click **Have Disk....** Direct the Device Wizard to the location of oemsetup.inf. If you have installed the driver installer kit to the default folder, the path is:
 - C:\Program Files\Emulex\AutoPilot Installer\Drivers\Storport\x86\HBA for the 32-bit driver versionor
 - C:\Program Files\Emulex\AutoPilot Installer\Drivers\Storport\x64\HBA for the x64 driver versionor
 - C:\Program Files\Emulex\AutoPilot Installer\Drivers\Storport\IA64\HBA for the Itanium driver version
12. Click **OK**. Select **Emulex LightPulse LPX000, PCI Slot X, Storport Miniport Driver** (your adapter model is displayed here).
13. Click **Next**.
14. Click **Finish**.

The driver installation is complete. The driver should start automatically. If the adapter is connected to a SAN or data storage device, a blinking yellow light on the back of the adapter indicates a link up condition.

Uninstallation

Uninstalling Emulex Driver Kits

Note: When you uninstall the Emulex driver kit, AutoPilot Installer is automatically uninstalled.

To uninstall a driver kit on a Windows Server 2008 system:

1. Open the **Programs and Features** control panel.
2. Select **Emulex FC Driver kit-2.xx.xxx** in the program list and click the **Uninstall** icon in the tool bar above the program list. If you have User Access Control enabled, click **Continue** when asked for permission.
3. Click **Yes**. The application is removed from the system. Click **OK**.

To uninstall a driver kit on a Server Core system:

1. From the system prompt, navigate to the "Program Files" folder on an x86 system or the "Program Files (x86)" folder on a 64-bit system.
2. Navigate to "Emulex\AutoPilot Installer".
3. Run "uninstall_elx_core_kit.bat". The driver files are removed from the system.

On all platforms, the reports folder in the "Emulex\AutoPilot Installer" folder is not removed, so you can still view installation history and the drivers that have been installed on the system. You can delete the reports folder at any time if you want.

Uninstalling the Emulex Drivers

The Emulex Storport Miniport and PLUS (ElxPlus) drivers are uninstalled using the Device Manager.

Note: On Windows 2008, after the message: "Warning - you are about to uninstall this device from your system", is displayed. You must select the checkbox "Delete the software for this device" in order to uninstall the driver.

To uninstall the Emulex Storport Miniport driver:

1. Select **Start>All Programs>Administrative Tools>Computer Management**.
2. Click **Device Manager**.
3. Double-click the adapter from which you want to remove the Storport Miniport driver. A device-specific console window is displayed. Select the **Driver** tab.
4. Click **Uninstall** and click **OK** to uninstall.

To uninstall the ElxPlus driver (uninstall the ElxPlus driver only if all adapters and installations of Emulex miniport drivers are uninstalled):

After running Device Manager (steps 1 and 2 above):

1. Click the plus sign (+) next to the Emulex PLUS driver class.
2. Right-click the Emulex driver and click **Uninstall**.
3. Click **OK** in the Confirm Device Removal window.

To uninstall or update an earlier version of the Storport Miniport driver (prior to version 1.20), you must remove the registry settings for the adjunct driver prior to manually installing a new driver.

To remove the adjunct driver registry settings:

1. Browse to the Storport Miniport driver version 1.20 (or later) driver kit that you downloaded and extracted.
2. Double-click on the deladjct.reg file. A Registry Editor window appears to confirm that you want to execute deladjct.reg.
3. Click **Yes**. The elxadjct key is removed from the registry.

Driver Configuration

FC Driver Configuration

The Emulex Storport Miniport driver has many options that you can modify to provide different behavior. You can set Storport Miniport driver parameters using the OneCommand Manager application. Refer the *OneCommand Manager Application User Manual* for information on using this utility to configure the driver.

Server Performance

I/O Coalescing

I/O Coalescing is enabled and controlled by two driver parameters: CoalesceMsCnt and CoalesceRspCnt. The effect of I/O Coalescing will depend on the CPU resources available on the server. With I/O Coalescing turned on, interrupts are batched, reducing the number of interrupts and maximizing the number of commands processed with each interrupt. For heavily loaded systems, this will provide better throughput.

With I/O Coalescing turned off (the default), each I/O processes immediately, one CPU interrupt per I/O. For systems not heavily loaded, the default will provide better throughput. The following table shows recommendations based upon the number of I/Os per adapter.

Table 2: Recommended Settings for I/O Coalescing

I/Os per Second	Suggested CoalesceMsCnt	Suggested CoalesceRspCnt
I/Os < 10000	0	8
10000 < I/Os < 18000	1	8
18000 < I/Os < 26000	1	16
I/Os > 26000	1	24

CoalesceMsCnt

The CoalesceMsCnt parameter controls the maximum elapsed time in milliseconds that the adapter waits before it generates a CPU interrupt. The value range is 0 - 63 (decimal) or 0x0 - 0x3F (hex). The default is 0 and disables I/O Coalescing.

CoalesceRspCnt

The CoalesceRspCnt parameter controls the maximum number of responses to batch before an interrupt generates. If CoalesceRspCnt expires, an interrupt generates for all responses collected up to that point. With CoalesceRspCnt set to less than 2, response coalescing is disabled and an interrupt triggers for each response. The value range for CoalesceRspCnt is 1 - 255 (decimal) or 0x1 - 0xFF (hex). The default value is 8.

Note: A system restart is required to make changes to CoalesceMsCnt and/or CoalesceRspCnt.

Performance Testing

There are three driver parameters that need to be considered (and perhaps changed from the default) for better performance testing: QueueDepth, CoalesceMsCnt and CoalesceRspCnt.

QueueDepth

If the number of outstanding I/Os per device is expected to exceed 32, increase this parameter to a value greater than the number of expected I/Os per device, up to a maximum of 254. The QueueDepth parameter defaults to 32. If 32 is set and not a high enough value, performance degradation may occur due to Storport throttling its device queue.

CoalesceMsCnt

CoalesceMsCnt defaults to zero. If you are using a performance evaluation tool such as IOMETER and if you expect the I/O activity to be greater than 8000 I/Os per second, set CoalesceMsCnt to 1 and reinitialized with an adapter reset or system reboot.

CoalesceRspCnt

CoalesceRspCnt defaults to 8. For all other values up to the maximum of 63, the adapter does not interrupt the host with a completion until either CoalesceMsCnt milliseconds has elapsed or CoalesceRspCnt responses are pending. The value of these two driver parameters reduces the number of interrupts per second which improves overall CPU utilization. However, there is a point where the number of I/Os per second is small relative to CoalesceMsCnt and this will slow down the completion process, causing performance degradation.

Performance Testing Examples

Test Scenario One

You execute IOMETER with an I/O depth of 1 I/O per device in a small-scale configuration (16 devices). In this case, the test does not exceed the adapter's performance limits and the number of I/Os per second are in the low thousands.

Recommendation: set CoalesceMsCnt to 0 (or leave the default value).

Test Scenario Two

You execute IOMETER with an I/O depth of 48 I/Os per device in a small-scale configuration (16 devices).

Recommendation: set QueueDepth to be greater than 48 (e.g. 64).

Driver Parameters for Windows

Activation Requirements

A parameter has one of the following activation requirements:

- Dynamic - The change takes effect while the system is running.
- Reset - Requires an adapter reset from the utility before the change takes effect.
- Reboot - Requires a reboot of the entire machine before the change takes effect. In this case, you are prompted to perform a reboot when you exit the utility.

The Driver Parameter table provides information such as the allowable range of values and factory defaults. Parameters can be entered in decimal or hexadecimal format.

Note: If you are creating custom unattended installation scripts, any driver parameter can be modified and included in the script.

Most parameters default to a setting that optimizes adapter performance.

Table 3: Storport Miniport Driver Parameters

Parameter	Definitions	Activation Requirement
Class= n	Class selects the class of service on FCP commands. If set to 2, class = 2. If set to 3, class = 3. Value: 2 - 3 Default = 3	Dynamic
CoalesceMsCnt= n	CoalesceMsCn specifies wait time in milliseconds to generate an interrupt response if CoalesceRspCnt has not been satisfied. Zero specifies an immediate interrupt response notification. A non-zero value enables response coalescing at the specified interval in milliseconds. Value: 0 - 63 (decimal) or 0x0 - 0x3F (hex) Default = 0 (0x0)	Reset
CoalesceRspCnt= n	CoalesceRspCn specifies the number of response entries that trigger an Interrupt response. Value: 0 - 255 (decimal) or 0x1 - 0xFF (hex) Default = 8 (0x8)	Reset
DiscoveryDelay= n	DiscoveryDelay controls whether the driver waits for 'n' seconds to start port discovery after link up. If set to 0 = immediate discovery after link up. If set to 1 or 2 = the number of seconds to wait after link-up before starting port discovery. Value: 0 - 2 seconds (decimal) Default = 0.	Dynamic

Table 3: Storport Miniport Driver Parameters (Continued)

Parameter	Definitions	Activation Requirement
DriverTraceMask	<p>The DriverTraceMask feature is only available on OS that supports extended system event logging.</p> <p>If set to 0 = the feature is disabled.</p> <p>If set to 1 = error events logging is enabled.</p> <p>If set to 4 = warning events logging is enabled.</p> <p>If set to 8 = informational events logging is enabled.</p> <p>The values can be masked to generate multi-levels of events logging.</p> <p>Values: 0, 1, 4 and 8.</p> <p>Default =0.</p>	Dynamic
EnableAck0=n	<p>Set to 1 to force sequence rather than frame level acknowledgement for class 2 traffic over an exchange. This applies to FCP data exchanges on IREAD and IWRITE commands.</p> <p>Value: 0 - 1 (decimal)</p> <p>Default = 1</p>	Reset
EnableAUTH	<p>EnableAUTH enables fabric authentication. This feature requires the authentication to be supported by the fabric. Authentication is enabled when this value is set to 1.</p> <p>Value: 0 - 1</p> <p>Default = 0</p>	Reboot
EnableFDMI=n	<p>If set to 1, enables management server login on fabric discovery. This allows Fabric-Device Management Interface (FDMI) to operate on switches that have FDMI-capable firmware.</p> <p>If set to 2, FDMI operates and uses the host name feature of FDMI.</p> <p>Value: 0 -2 (decimal)</p> <p>Default = 0</p>	Reset
EnableNPIV=n	<p>If set to 1, enables N_Port_ID virtualization (NPIV). Requires NPIV supported firmware for the adapter.</p> <p>Value: 0 -1</p> <p>Default = 0 (disabled)</p> <p>Note: To run the driver using NPIV or SLI-3 optimization, the firmware must be version 2.72a0 or later. If an earlier version is used, the driver runs in SLI-2 mode and does not support NPIV.</p> <p>Note: NPIV is not available on 1Gb/s and 2 Gb/s adapters.</p>	Reboot

Table 3: Storport Miniport Driver Parameters (Continued)

Parameter	Definitions	Activation Requirement
ExtTransferSize	<p>ExtTransferSize is an initialization-time parameter that affects the maximum SGL that the driver can handle, which determines the maximum I/O size that a port will support.</p> <p>If set to 0 = the maximum transfer size is 512KB. If set to 1= the maximum transfer size is 1MB.</p> <p>If set to 2 = the maximum transfer size is 2MB.</p> <p>Value: 0 - 2 Default = 0 (disabled)</p>	
FrameSizeMSB= n	<p>FrameSizeMSB controls the upper byte of receive FrameSize if issued in PLOGI. This allows the FrameSize to be constrained on 256-byte increments from 256 (1) to 2048 (8).</p> <p>Value: 0 - 8 Default = 0</p>	Reset
InitTimeout= n	<p>Determines the number of time-out seconds during driver initialization for the link to come up. If the link fails to come up by InitTimeout, driver initialization exits but is still successful. If the link comes up before InitTimeout, the driver sets double the amount for discovery to complete.</p> <p>Value: 5 -30 seconds or 0x5 - 0x1E (hex) Default = 15 seconds (0xF)</p>	Reboot
LimTransferSize	<p>Limits maximum transfer size when non-zero to selectable values.</p> <p>Values: 0 = Port Default 1 = 64Kb 2 = 128 Kb 3 = 256Kb</p>	Reboot
LinkSpeed= n	<p>LinkSpeed has significance only if the adapter supports speeds other than one Gb/s.</p> <p>Value: Auto-select, 1 Gb/s, 2 Gb/s, 4 Gb/s, 8 Gb/s Default = Auto-select</p> <p>Note: Setting this option incorrectly can cause the adapter to fail to initialize.</p>	Reset
LinkTimeOut= n	<p>LinkTimeOut applies to a private loop only. A timer is started on all mapped targets using the link timeout value. If the timer expires before discovery is re-resolved, commands issued to timed out devices returns a SELECTION_TIMEOUT. The Storport driver is notified of a bus change event which leads to the removal of all LUNs on the timed out devices.</p> <p>Value: 1 - 500 seconds or 0x0 - 0xFE (hex) Default = 30 (0x1E)</p>	Dynamic

Table 3: Storport Miniport Driver Parameters (Continued)

Parameter	Definitions	Activation Requirement
LogErrors= n	<p>LogErrors determine the minimum severity level required to enable entry of a logged error into the system event log. Errors are classified as severe, malfunction or command level.</p> <p>A severe error requires user intervention to correct a firmware or adapter problem. An invalid link speed selection is an example of a severe error.</p> <p>A malfunction error indicates that the system has problems, but user intervention is not required. An invalid fabric command type is an example of a malfunction error.</p> <p>An object allocation failure is an example of a command error.</p> <p>If set to 0 = all errors are logged. If set to 1 = command level errors are logged. If set to 2 = malfunction errors are logged. If set to 3 = severe errors are logged.</p> <p>Value: 0 - 3 Default = 3</p>	Dynamic
QueueTarget= n	<p>QueueTarget controls I/O depth limiting on a per target or per LUN basis.</p> <p>If set to 0 = depth limitation is applied to individual LUNs. If set to 1 = depth limitation is applied across the entire target.</p> <p>Value: 0 -1 or 0x0 - 0x1 (hex) Default = 0 (0x0)</p>	Dynamic
RmaDepth= n	<p>RmaDepth sets the remote management buffer queue depth. The greater the depth, the more concurrent management controls can be handled by the local node.</p> <p>Value: 8 - 64, or 0x8 - 0x40 (hex) Default = 16 (0x10)</p> <p>Note: The RmaDepth driver parameter pertains to the functionality of the OneCommand Manager application.</p>	Reboot
ScanDown= n	<p>If set to 0 = lowest AL_PA = lowest physical disk (ascending AL_PA order). If set to 1 = highest AL_PA = lowest physical disk (ascending SEL_ID order).</p> <p>Value: 0 - 1 Default = 1</p> <p>Note: This option applies to private loop only in DID mode.</p>	Reboot

Table 3: Storport Miniport Driver Parameters (Continued)

Parameter	Definitions	Activation Requirement
SLIMode= n	<p>If set to 0 = autoselect firmware, use the newest firmware installed. If set to 2 = implies running the adapter firmware in SLI-2 mode. If set to 3 = implies running the adapter firmware in SLI-3 mode.</p> <p>Value: 0, 2 and 3 Default = 0</p>	Reboot
Topology= n	<p>Topology values can be 0 to 3. If set to 0 (0x0) = FC Arbitrated Loop (FC-AL). If set to 1 (0x1) = PT-PT fabric. If set to 2 (0x2) = *FC-AL first, then attempt PT-PT. If set to 3 (0x3) = *PT-PT fabric first, then attempt FC-AL.</p> <p>* Topology fail-over requires v3.20 firmware or higher. If firmware does not support topology fail-over, options 0,2 and 1,3 are analogous.</p> <p>Value: 0 - 3 Default = 2 (0x2)</p>	Reset
TraceBufSiz= n	<p>TraceBufSiz sets the size in bytes for the internal driver trace buffer. The internal driver trace buffer acts as an internal log of the driver's activity.</p> <p>Value: 250,000 - 2,000,000 or 0x3D090 - 0x1E8480 (hex). Default = 250,000 (0x3D090)</p>	Reboot

Troubleshooting

There are several circumstances in which your system may operate in an unexpected manner. The Troubleshooting section contains reference tables on event codes and error messages and provides information regarding unusual situations.

General Troubleshooting

Table 4: General Troubleshooting

Problem	Answer/Solution
The operating system fails to install or does not successfully install the driver.	Verify that the operating system is supported by the driver.
Windows Device Manager shows a code 10 or code 39 with a yellow or red exclamation point on the device.	The firmware image does not match the installed device drivers, or the firmware is corrupt. Using the OneCommand Manager application or one of the WinPE offline or online utilities, install a version of firmware that is compatible with the driver.
The firmware is corrupt or non-responsive.	Using the OneCommand Manager application or one of the WinPE offline or online utilities, install a version of firmware that is compatible with the driver

Troubleshooting the Driver

Event Tracing

Trace messages are part of the Emulex lpfc log messages.

Storage Event Tracing supports two types of events:

- FFInit (0x00000001) - events that occurred at HwFindAdapter and HwInitialize.
- FFIO (0x00000002) - events that occurred during I/O.

Storage Event Tracing supports four levels of events:

- DbgLvlErr (0x00000001) - error level
- DbgLvlWrn (0x00000002) - warning level
- DbgLvlInfo (0x00000004) - Information level
- DbgLvlInfo (0x00000008) - excessive information level

Note: To view trace messages, you must enable Event Tracing in the operating system. See your Microsoft operating system documentation for more information.

Table 5: Event Tracing Summary Table

LOG Message Definition	From	To	Reserved Through	Verbose Description
ELS	0100	0130	0199	ELS events
Discovery	0202	0262	0299	Link discovery events

Table 5: Event Tracing Summary Table (Continued)

LOG Message Definition	From	To	Reserved Through	Verbose Description
Mailbox	0310	0326	0399	Mailbox events
INIT	0400	0463	0499	Initialization events
FCP	0701	0749	0799	FCP traffic history events
Link	1300	1306	1399	Link events
Tag	1400	1401	1499	
NPIV	1800	1804	1800	N_Port_ID virtualization events

Event Trace Messages

ELS Log Messages (0100 - 0130)

lpfc_mes0100: 0100: FLOGI failure - ulpStatus: x%x, ulpWord[4]:x%x

DESCRIPTION: An ELS fabric login (FLOGI) command that was sent to the fabric failed.

SEVERITY: Error

LOG: LOG_ELS verbose

ACTION: Check the fabric connection.

SEE ALSO: lpfc_mes0110.

lpfc_mes0101: 0101: FLOGI completes successfully - NPortId: x%x, RaTov: x%x, EdTov: x%x

DESCRIPTION: An ELS FLOGI command that was sent to the fabric succeeded.

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

lpfc_mes0102: 0102: PLOGI completes to NPortId: x%x

DESCRIPTION: The adapter performed an N_port_login (PLOGI) into a remote NPort.

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

lpfc_mes0103: 0103:PRLI completes to NPortId: x%x, TypeMask: x%x, Fcp2Recovery: x%x

DESCRIPTION: The adapter performed a process login (PRLI) into a remote NPort.

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

lpfc_mes0104: 0104: ADISC completes to NPortId x%x

DESCRIPTION: The adapter performed a discover address (ADISC) into a remote NPort.

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

lpfc_mes0105: 0105: LOGO completes to NPortId: x%x

DESCRIPTION: The adapter performed a LOGO into a remote NPort.

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

lpfc_mes0112: 0112: ELS command: x%x, received from NPortId: x%x

DESCRIPTION: Received the specific ELS command from a remote NPort.

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

REMARKS: lpfc_mes0114 and lpfc_mes0115 are also recorded for more details if the corresponding severity level is set. You can use the XRI to match the messages.

lpfc_mes0114: 0114: PLOGI chkparm OK

DESCRIPTION: Received a PLOGI from a remote NPORT and its FC service parameters match this adapter. Request can be accepted.

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

SEE ALSO: lpfc_mes0112.

lpfc_mes0115: 0115: Unknown ELS command: x%x, received from NPortId: x%x\n

DESCRIPTION: Received an unsupported ELS command from a remote NPORT.

SEVERITY: Error

LOG: LOG_ELS verbose

ACTION: Check remote NPORT for potential problem.

SEE ALSO: lpfc_mes0112.

lpfc_mes0128: 0128: Accepted ELS command: OpCode: x%x

DESCRIPTION: Accepted an ELS command from a remote NPORT.

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

lpfc_mes0129: 0129: Rejected ELS command: OpCode: x%x

DESCRIPTION: Rejected ELS command from a remote NPORT.

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

lpfc_mes0130: 0130: ELS command error: ulpStatus: x%x, ulpWord[4]: x%x

DESCRIPTION: ELS command failure.

SEVERITY: Error

LOG: LOG_ELS verbose

ACTION: Check remote NPORT for potential problem.

Discovery Log Messages (0202 - 0262)

lpfc_mes0202: 0202: Start Discovery: Link Down Timeout: x%x, initial PLOGICount:%d

DESCRIPTION: Device discovery/rediscovery after FLOGI, FAN or RSCN has started. TMO is the current value of the soft link time. It is used for link discovery against the LinkDownTime set in parameters. DISC CNT is number of nodes being discovered for link discovery. RSCN CNT is number of nodes being discovered for RSCN discovery. There will be value in either DISC CNT or RSCN CNT depending on which discovery is being performed.

SEVERITY: Information

LOG: LOG_DISCOVERY verbose

ACTION: No action needed, informational.

lpfc_mes0204: 0204: Discovered SCSI Target: WWN word 0: x%x, WWN word 1: x%x, DID: x%x, RPI: x%x

DESCRIPTION: Device discovery found SCSI target.

SEVERITY: Information

LOG: LOG_DISCOVERY verbose

ACTION: No action needed, informational.

lpfc_mes0214: 0214: RSCN received: Word count:%d

DESCRIPTION: Received RSCN from fabric.

SEVERITY: Information

LOG: LOG_DISCOVERY verbose

ACTION: No action needed, informational.

lpfc_mes0215: 0215: RSCN processed: DID: x%x

DESCRIPTION: Processed RSCN from fabric.

SEVERITY: Information

LOG: LOG_DISCOVERY verbose

ACTION: No action needed, informational.

lpfc_mes0225: 0225: Device Discovery completes

DESCRIPTION: This indicates successful completion of device (re)discovery after a link up.

SEVERITY: Information

LOG: LOG_DISCOVERY verbose

ACTION: No action needed, informational.

lpfc_mes0229: 0229: Assign SCSIId x%x to WWN word 0: x%x, WWN word 1: x%x, NPortId x%x

DESCRIPTION: The driver assigned a SCSI ID to a discovered mapped FCP target. BindType - 0: DID 1:WWNN 2:WWPN

SEVERITY: Information

LOG: LOG_DISCOVERY verbose

ACTION: No action needed, informational.

lpfc_mes0230: 0230: Cannot assign SCSIId to WWN word 0: x%x, WWN word 1: x%x, NPortId x%x

DESCRIPTION: SCSI ID assignment failed for discovered target.

SEVERITY: Warning

LOG: LOG_ELS verbose

ACTION: Review system configuration.

lpfc_mes0232: 0232: Continue discovery at sequence number%d, PLOGIs remaining:%d

DESCRIPTION: NPort discovery sequence continuation.

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

lpfc_mes0235: 0235: New RSCN being deferred due to RSCN in process

DESCRIPTION: An RSCN was received while processing a previous RSCN.

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

lpfc_mes0236: 0236: Issuing command to name server" type: x%x

DESCRIPTION: The driver is issuing a nameserver request to the fabric. Also recorded if a GID_FT is sent.

SEVERITY: Information

LOG: LOG_DISCOVERY verbose

ACTION: No action needed, informational.

SEE ALSO: lpfc_mes0239 or lpfc_mes0240.

lpfc_mes0238: 0238: NameServer response DID count:%d

DESCRIPTION: Received a response from fabric name server with N DIDs.

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

lpfc_mes0239: 0239: NameServer Response: next DID value: x%x

DESCRIPTION: The driver received a nameserver response. And, this message is recorded for each DID included in the response data.

SEVERITY: Information

LOG: LOG_DISCOVERY verbose

ACTION: No action needed, informational.

SEE ALSO: lpfc_mes0236.

lpfc_mes0240: 0240: NameServer Response Error - CmdRsp:x%x, ReasonCode: x%x, Explanation x%x

DESCRIPTION: The driver received a nameserver response containing a status error.

SEVERITY: Error

LOG: LOG_DISCOVERY verbose

ACTION: Check Fabric configuration. The driver recovers from this and continues with device discovery.

SEE ALSO: lpfc_mes0236.

lpfc_mes0256: 0256: Start node timer on NPortId: x%x, timeout value:%d

DESCRIPTION: Starting timer for disconnected target with NPort ID and timeout value.

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

lpfc_mes0260: 0260: Stop node timer on NPortId: x%x, SCSIId: x%x

DESCRIPTION: Discontinuing timer for reconnected target with NPort ID and SCSI ID.

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

lpfc_mes0262: 0262: Node timeout on NPortId: x%x, SCSIId: x%x

DESCRIPTION: Disconnected NPort ID, SCSI ID has failed to reconnect within timeout limit.

SEVERITY: Error

LOG: LOG_ELS verbose

ACTION: Review system configuration.

Mailbox Log Messages (0310 - 0326)

lpfc_mes0310: 0310: Mailbox command timeout - HBA unresponsive

DESCRIPTION: A Mailbox command was posted to the adapter and did not complete within 30 seconds.
sync - 0: asynchronous mailbox command is issued 1: synchronous mailbox command is issued.

SEVERITY: Error

LOG: LOG_MBOX verbose

ACTION: This error could indicate a software driver or firmware problem. If no I/O is going through the adapter, reboot the system. If these problems persist, report these errors to Technical Support.

lpfc_mes0326: 0326: Reset HBA - HostStatus: x%x

DESCRIPTION: The adapter has been reset.

SEVERITY: Information

LOG: LOG_MBOX verbose

ACTION: No action needed, informational.

INIT Log Messages (0400 - 0463)

lpfc_mes0400: 0400 Initializing discovery module: OptionFlags: x%x

DESCRIPTION: Driver discovery process is being initialized with internal flags as shown.

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

lpfc_mes0401: 0401: Initializing SLI module: DeviceId: x%x, NumMSI:%d

DESCRIPTION: PCI function with device id and MSI count as shown is being initialized for service level interface.

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

lpfc_mes0405: Service Level Interface (SLI) 2 selected\n");

DESCRIPTION: Service Level Interface level 2 is selected.

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

lpfc_mes0406: 0406: Service Level Interface (SLI) 3 selected\n");

DESCRIPTION: Service Level Interface level 3 is selected.

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

lpfc_mes0436: Adapter not ready: hostStatus: x%x

DESCRIPTION: The adapter failed during powerup diagnostics after it was reset.

SEVERITY: Error

LOG: LOG_INIT verbose

ACTION: This error could indicate a hardware or firmware problem. If problems persist report these errors to Technical Support.

lpfc_mes0442: 0442: Adapter failed to init, CONFIG_PORT, mbxStatus x%x

DESCRIPTION: Adapter initialization failed when issuing CONFIG_PORT mailbox command.

SEVERITY: Error

LOG: LOG_INIT verbose

ACTION: This error could indicate a hardware or firmware problem. If problems persist report these errors to Technical Support.

lpfc_mes0446: 0446: Adapter failed to init, CONFIG_RING, mbxStatus x%x

DESCRIPTION: Adapter initialization failed when issuing CFG_RING mailbox command.

SEVERITY:

LOG: LOG_INIT verbose

ACTION: This error could indicate a hardware or firmware problem. If problems persist report these errors to Technical Support.

lpfc_mes0454: 0454: Adapter failed to init, INIT_LINK, mbxStatus x%x

DESCRIPTION: Adapter initialization failed when issuing INIT_LINK mailbox command.

SEVERITY: Error

LOG: LOG_INIT verbose

ACTION: This error could indicate a hardware or firmware problem. If problems persist report these errors to Technical Support.

lpfc_mes0458: 0458: Bring Adapter online

DESCRIPTION: The FC driver has received a request to bring the adapter online. This may occur when running HBAnyware.

SEVERITY: Warning

LOG: LOG_INIT verbose

ACTION: None required.

lpfc_mes0460: 0460: Bring Adapter offline

DESCRIPTION: The FC driver has received a request to bring the adapter offline. This may occur when running HBAnyware.

SEVERITY: Warning

LOG: LOG_INIT verbose

ACTION: None required.

lpfc_mes0463: 0463: Adapter firmware error: hostStatus: x%x, Info1(0xA8): x%x, Info2 (0xAC): x%x

DESCRIPTION: The firmware has interrupted the host with a firmware trap error.

SEVERITY: Error

LOG: LOG_INIT verbose

ACTION: Review HBAnyware diagnostic dump information.

FCP Log Messages (0701 - 0749)

lpfc_mes0701: 0701: Issue Abort Task Set to PathId: x%x, TargetId: x%x, Lun: x%x

DESCRIPTION: The driver has issued a task management command for the indicated SCSI device address.

SEVERITY: Warning

LOG: LOG_INIT verbose

ACTION: Review system configuration.

lpfc_mes0703: 0703: Issue LUN reset to PathId: x%x, TargetId: x%x, Lun: x%x, Did: x%x

DESCRIPTION: Storport is requesting a reset of the indicated LUN.

SEVERITY: Warning

LOG: LOG_INIT verbose

ACTION: Review system configuration. Possible side-effect of cluster operations.

lpfc_mes0713: 0713: Issued Target Reset to PathId:%d, TargetId:%d, Did: x%x

DESCRIPTION: Storport detected that it needs to abort all I/O to a specific target. This results in login reset to the target in question.

SEVERITY: Warning

LOG: LOG_FCP verbose

ACTION: Review system configuration. Possible side-effect of cluster operations.

SEE ALSO: lpfc_mes0714.

lpfc_mes0714: 0714: Issued Bus Reset for PathId:%d

DESCRIPTION: Storport is requesting the driver to reset all targets on this adapter.

SEVERITY: Warning

LOG: LOG_FCP verbose

ACTION: Review system configuration. Possible side-effect of cluster operations.

SEE ALSO: lpfc_mes0713.

lpfc_mes0716: 0716: FCP Read Underrun, expected%d, residual%d

DESCRIPTION: FCP device provided less data than was requested.

SEVERITY: Supplement Information

LOG: LOG_FCP verbose

ACTION: No action needed, informational.

SEE ALSO: lpfc_mes0730.

lpfc_mes0729: 0729: FCP command error: ulpStatus: x%x, ulpWord[4]: x%x, XRI: x%x, ulpWord[7]: x%x

DESCRIPTION: The specified device failed an I/O FCP command.

SEVERITY: Warning

LOG: LOG_FCP verbose

ACTION: Check the state of the target in question.

REMARKS: lpfc_mes0730 is also recorded if it is a FCP Rsp error.

lpfc_mes0730: 0730: FCP response error: Flags: x%x, SCSI status: x%x, Residual:%d

DESCRIPTION: The FCP command failed with a response error.

SEVERITY: Warning

LOG: LOG_FCP verbose

ACTION: Check the state of the target in question.

remark: lpfc_mes0716, lpfc_mes0734, lpfc_mes0736 or lpfc_mes0737 is also recorded for more details if the corresponding SEVERITY level is set.

SEE ALSO: lpfc_mes0729.

lpfc_mes0734: 0734: Read Check: fcp_parm: x%x, Residual x%x

DESCRIPTION: The issued FCP command returned a Read Check Error.

SEVERITY: Warning

LOG: LOG_FCP verbose

ACTION: Check the state of the target in question.

SEE ALSO: lpfc_mes0730.

lpfc_mes0737: 0737: SCSI check condition, SenseKey x%x, ASC x%x, ASCQ x%x, SrbStatus: x%x

DESCRIPTION: The issued FCP command resulted in a Check Condition.

SEVERITY: Warning

LOG: LOG_FCP verbose

ACTION: Review SCSI error code values.

SEE ALSO: lpfc_mes0730.

0747: Target reset complete: PathId: x%x, TargetId: x%x, Did: x%x

DESCRIPTION: A target reset operation has completed.

SEVERITY: Warning

LOG: LOG_FCP verbose

ACTION: Review system configuration. Possible side-effect of cluster operations.

REMARK: See also Message 0713.

0748: Lun reset complete: PathId: x%x, TargetId: x%x, Lun: x%x

DESCRIPTION: A LUN reset operation has completed.

SEVERITY: Warning

LOG: LOG_FCP verbose

ACTION: Review system configuration. Possible side-effect of cluster operations.

REMARK: See also Message 0703.

0749: Abort task set complete: Did: x%x, SCSIId: x%x

DESCRIPTION: A task management has completed.

SEVERITY: Warning

LOG: LOG_FCP verbose

ACTION: Review system configuration. Possible side-effect of cluster operations.

REMARK: See also Message 0701.

Link Log Messages (1302 - 1306)

lpfc_mes1302: 1302: Invalid speed for this board:%d, forced link speed to auto

DESCRIPTION: The driver is re-initializing the link speed to auto-detect.

SEVERITY: Warning

LOG: LOG_LINK_EVENT verbose

ACTION: None required.

lpfc_mes1303: 1303: Link Up event: tag: x%x, link speed:%dG, topology (0 = Pt2Pt, 1 = AL):%d

DESCRIPTION: A link up event was received. It is also possible for multiple link events to be received together.

SEVERITY: Error

LOG: LOG_LINK_EVENT verbose

ACTION: If numerous link events are occurring, check physical connections to the FC network.

REMARKS: lpfc_mes1304 is recorded if Map Entries > 0 and the corresponding mode and SEVERITY level is set.

lpfc_mes1305: 1305: Link down even: tag x%x

DESCRIPTION: A link down event was received.

SEVERITY: Error

LOG: LOG_LINK_EVENT verbose

ACTION: If numerous link events are occurring, check physical connections to the FC network.

lpfc_mes1306: 1306: Link Down timeout

DESCRIPTION: The link was down for greater than the configuration parameter (HLinkTimeOut) seconds. All I/O associated with the devices on this link will be failed.

SEVERITY: Warning

LOG: LOG_LINK_EVENT verbose

ACTION: Check adapter cable/connection to SAN.

Tag Messages (1400 - 1401)

lpfc_mes1400 1400: Tag out of range: ContextIndex: x%x, MaxIndex: x%x, ulpCommand: x%x

DESCRIPTION: Firmware has generated an invalid response.

SEVERITY: Error

LOG: LOG_LINK_EVENT verbose

ACTION: Review hardware configuration. Contact Emulex Technical Support.

lpfc_mes1401 1401: Invalid tag: ContextIndex: x%x, ulpCommand: x%x

DESCRIPTION: Firmware has generated an invalid response.

SEVERITY: Error

LOG: LOG_LINK_EVENT verbose

ACTION: Review hardware configuration. Contact Emulex Technical Support.

NPIV Messages (1800 - 1899)

lpfc_mes1800 1800: NPIV FDISC failure VPI: x%x Error x%x Reason x%x

DESCRIPTION: Virtual Port fails on a FDISC to the switch with the error and reason listed.

SEVERITY: Error

LOG: LOG_NPIV verbose

ACTION: Check to ensure the switch supports NPIV.

lpfc_mes1801 1801: Memory allocation failure for NPIV port: x%x

DESCRIPTION: Fails to allocated the block of memory for the Virtual Port.

SEVERITY: Error

LOG: LOG_NPIV verbose

ACTION: Check to ensure system has sufficient kernel memory.

lpfc_mes1802 1802: Exceeded the MAX NPIV port: x%x

DESCRIPTION: Exceeded the number of Virtual Port allows on the adapter.

SEVERITY: Error

LOG: LOG_NPIV verbose

ACTION: Reduce the number of Virtual Ports.

lpfc_mes1803 1803: Virtual Port: x%x VPI:x%x successfully created.

DESCRIPTION: Virtual Port ID is successfully created.

SEVERITY: Information

LOG: LOG_NPIV verbose

ACTION: No action needed, informational.

lpfc_mes1804 1804: Removing Virtual Port: x%x VPI:x%x

DESCRIPTION: Removing Virtual Port ID.

SEVERITY: Information

LOG: LOG_NPIV verbose

ACTION: No action needed, informational.

ELS Messages (1900 - 1999)

1900: x%x sends ELS_AUTH_CMD x%x with TID x%x

DESCRIPTION: An ELS_AUTH_CMD is sent.

SEVERITY: Information

LOG: LOG_FCSP verbose

ACTION: No action needed, informational.

1901: x%x sends ELS_AUTH_REJECT x%x x%x to x%x

DESCRIPTION: An ELS_AUTH_REJECT is sent.

SEVERITY: Information

LOG: LOG_FCSP verbose

ACTION: No action needed, informational.

1902: Receives x%x from x%x in state x%x

DESCRIPTION: Receives an ELS_AUTH_CMD.

SEVERITY: Information

LOG: LOG_FCSP verbose

ACTION: No action needed, informational.

1903: Receives ELS_AUTH_RJT x%x x%x

DESCRIPTION: Receives an ELS_AUTH_REJECT.

SEVERITY: Information

LOG: LOG_FCSP verbose

ACTION: No action needed, informational.

1904: Authentication ends for x%x with status x%x (%d %d)

DESCRIPTION: Authentication is done.

SEVERITY: Information

LOG: LOG_FCSP verbose

ACTION: No action needed, informational.

1905: Authentication policy change for local x%08x x%08x remote x%08x%08x

DESCRIPTION: Authentication policy has been changed.

SEVERITY: Information

LOG: LOG_FCSP verbose

ACTION: No action needed, informational.

Appendix A Error/Event Log Information

Error/Event Logs

Viewing the Error Log

The system event log is a standard feature of Windows Server software. All events logged by the Emulex Storport Miniport will be Event ID 11 with source "elxstor".

To view the error LOG:

1. Open the Event Viewer window:
 - Click **Start>Programs>Administrative Tools>Event Viewer**
 - or
 - Right-click on **My Computer**, **Manage** and **Event Viewer** in **Computer Management**.

The Event Viewer window is displayed.

2. Double-click any event with the source name ELXSTOR.
3. Examine the entry at offset 0x10 and Event ID 11. The Emulex event code is found in byte 0010 and supplementary data is in the byte offsets 0011 through 0013 (in example Figure 2, byte 0010 = 9b, byte 0011 = 00, byte 0012 = 29 and byte 0013 = 00).

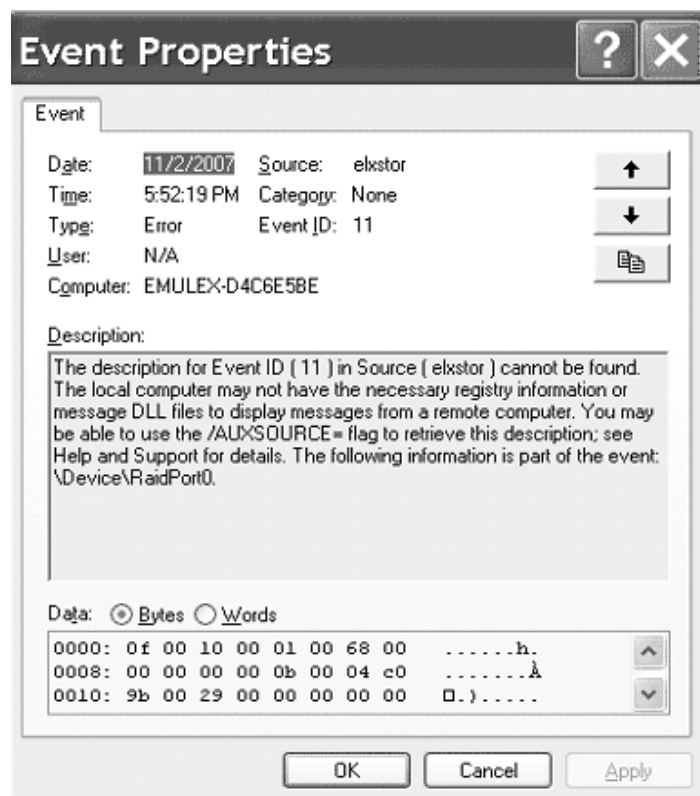


Figure 2: Event Properties

Severity Scheme

When the Event Viewer is launched, there are three branches: Application, Security and System. All ELXSTOR error log entries are found under the System branch and all ELXSTOR error log entries have the Event Viewer severity level of “error”.

- A severe error code indicates that the driver, firmware or adapter is behaving abnormally and your intervention is required to correct the problem.
- A malfunction error code indicates that there is a problem with the system, but your intervention is not required.
- A command error code indicates that an event has transpired, but does not require your intervention. An event may be problem-oriented, such as an invalid fabric command sub-type. An event may not be problem-oriented, such as exhausted retries on PLOGI or PDISC.

Related Driver Parameter: LogError

The LogError driver parameter determines the minimum severity level to enable entry of a logged error into the system.

- If set to 0 = all errors regardless of severity are logged.
- If set to 1 = severe, malfunction and command level errors are logged.
- If set to 2 = both severe and malfunction errors are logged.
- If set to 3 = only severe errors are logged.

Note: See the Configuration Section for instructions on how to set driver parameters.

Note: Set LogError to 1 if you are troubleshooting SAN connectivity or device discovery issues.

Format of an Error Log Entry

An error log entry will take the form of an event. This event is described by:

- Date (date entry was logged)
- Source (elxstor)
- Time (time entry was logged)
- Category (none)
- Type (error)
- Event id (0)
- User (N/A)
- Computer (name of computer)

Error Codes Tables

Table 6: Severe Errors

Bits 0 - 7	Interpretation
0x00	Invalid link speed selection (SLI2-3 mode)
0x01	READ_REV failed (SLI2-3 mode)
0x02	Invalid adapter type (LightPulse)
0x03	Invalid adapter type (LightPulse)
0x04	CONFIG_PORT failed
0x06	READ_CONFIG failed
0x07	CONFIG_RING 0 failed
0x09	CONFIG_RING 1 failed
0x08	CONFIG_RING 2 failed
0x0A	CONFIG_RING 3 failed
0x0B	INIT_LINK failed (SLI2-3 mode)
0x0C	INIT_LINK failed (SLI2-3 mode)
0x0D	READ_REV failed (SLI2-3 mode)
0x0E	Invalid adapter type (LightPulse)
0x0F	Invalid adapter type (LightPulse)
0x10	CONFIG_PORT failed (reinitialization)
0x12	READ_CONFIG command failed (reinitialization)
0x13	CONFIG_RING 0 failed (reinitialization)
0x14	CONFIG_RING 1 failed (reinitialization)
0x15	CONFIG_RING 2 failed (reinitialization)
0x16	CONFIG_RING 3 failed (reinitialization)
0x17	Unresponsive adapter port (SLI2-3 mode)
0x1C	Firmware trap: info1 (SLI2-3 mode)
0x1D	Firmware trap: info2 (SLI2-3 mode)
0x1E	Over-temperature error condition (LightPulse)
0x1F	Firmware-initiated adapter port reset (LightPulse)
0x20	Adapter port error attention (LightPulse)
0x22	Over-temperature warning (LightPulse)
0x23	Returned to safe temperature (LightPulse)
0x24	Invalid response tag (SLI2-3 mode)
0x25	Invalid response tag (SLI2-3 mode)
0x26	Invalid response tag (SLI2-3 mode)
0x27	Invalid response sequence (SLI2-3 mode)
0x28	Failure on REG_LOGIN mailbox command
0x29	Unable to initiate fabric binding operation
0x2A	Attempted ADISC to non-existent node
0x2B	Failure on iocb context allocation
0x2C	Unable to initiate nport unbinding operation
0x2D	Unable to initiate nport binding operation
0x30	Failure on mailbox context allocation
0xA1	Failed to initialize adapter port (LightPulse)
0xC0	Insufficient revision level for STORPORT.SYS
0xC1	Failed to allocate miniport un-cached extension
0xC2	Insufficient un-cached extension space
0xC4	Port initialization failure (LightPulse)
0xC5	Utility mailbox command error
0xC6	SLI4 Pre-initialization failure
0xD3	NPIV memory allocation failure
0xF0	Unresponsive adapter port (SLI4 mode)

Table 6: Severe Errors (Continued)

Bits 0 - 7	Interpretation
0xF4	ULP Unrecoverable Error: low part (SLI4 mode)
0xF5	ULP Unrecoverable Error: high part (SLI4 mode)
0xF6	ARM Unrecoverable Error (SLI4 mode)
0xF7	READ_NV failed (SLI4 mode)
0xF8	READ_NV failed (SLI4 mode)
0xF9	READ_REV failed (SLI4 mode)
0xFA	READ_CONFIG failed (SLI4 mode)
0xFB	Failed to post header templates (SLI4 mode)
0xFC	Invalid Completion Queue Entry (SLI4 mode)
0xFD	Invalid Completion Queue Entry (SLI4 mode)
0xFE	Invalid Completion Queue Entry (SLI4 mode)

Table 7: Malfunction Errors

Bits 0 - 7	Interpretation
0x21	Spurious mailbox command interrupt
0x31	Unrecognized mailbox command completion
0x32	Duplicate link attention: event tag unchanged
0x33	Invalid link attention: no link state indicated
0x34	Duplicate link attention: link state unchanged
0x35	Error reading common service parameters for port
0x36	Error reading common service parameters for fabric
0x37	Error reading common service parameters for nport
0x3B	Failed to create node object
0x3C	PRLI initiation failure
0x42	Exhausted retries on FLOGI
0x45	ELS command rejected
0x49	Exhausted retries on PLOGI
0x4E	World Wide Port Name mismatch on ADISC
0x4F	World Wide Node Name mismatch on ADISC
0x50	ADISC response failure
0x55	LOGO response failure
0x57	PRLI to non-existent node
0x5A	PRLI response error
0x5F	CT command error
0x62	Name server response error
0x66	State Change Notification registration failure
0x6A	Unrecognized ELS command received
0x6F	Received PRLI from un-typed source
0x73	Failed to pend PRLI for authentication
0x77	Failed to allocate Node object
0x7A	REG_VPI failed
0xA3	Command context allocation failure
0xAC	Read check error
0xB0	Node timeout: device removal signaled to Storport

Table 8: Command Errors

Bits 0 - 7	Interpretation
0x43	Fabric login succeeded
0x46	ELS command failed

Table 8: Command Errors (Continued)

Bits 0 - 7	Interpretation
0x43	Fabric login succeeded
0x47	Exhausted retries on ELS command
0x4A	PLOGI accepted
0x56	LOGO accepted
0x59	PRLI accepted
0x63	Fabric name server response
0x6B	ELS RSCN processed
0x71	LOGO received from fabric
0x79	FDISC accepted
0xA4	Report LUNs error (initial I/O to discovered target)
0xA5	Local error indication on FCP command
0xA8	Data overrun
0xA9	FCP command error
0xAD	Local reject indication on FCP command

Table 9: Event Indications

Bits 0 - 7	Interpretation
0x18	Port shutdown event (LightPulse)
0x19	Port in off-line state (LightPulse)
0x1A	Port in on-line state (LightPulse)
0x1B	Port in off-line state (LightPulse)
0xA7	Data underrun
0xD0	NPIV Virtual Port creation success (Virtual Port Did in bits 8-31)
0xD1	NPIV Virtual Port creation failed (Virtual Port index in bits 8-31)
0xD2	NPIV Virtual Port FDISC failed (Virtual Port index in bits 8-31)
0xD4	Exceeded max Virtual Port supported (Virtual Port index in bits 8-31)
0xD5	NPIV Virtual Port removal (Virtual Port Did in bits 8-31)
0xE0	Authenticated successfully (remote Did in bits 8-31)
0xE1	Failed to authenticate (remote Did in bits 8-31)
0xE2	Authentication not support (remote Did in bits 8-31)
0xE3	Authentication ELS command timeout (remote Did in bits 8-31)
0xE4	Authentication transaction timeout (remote Did in bits 8-31)
0xE5	LS_RJT other than Logical Busy received for Authentication transaction (remote Did in bits 8-31)
0xE6	LS_RJT Logical Busy received for Authentication Transaction (remote Did in bits 8-31)
0xE7	Received Authentication Reject other than Restart (remote Did in bits 8-31)
0xE8	Received Authentication Reject Restart (remote Did in bits 8-31)
0xE9	Received Authentication Negotiate (remote Did in bits 8-31)
0xEA	Authentication spurious traffic (remote Did in bits 8-31)
0xEB	Authentication policy has been changed (remote Did in bits 8-31)
0xED	Same passed were set for both local and remote entities (remote Did in bits 8-31)

Viewing the Event Log

Event Log Interpretation

- All events logged by Emulex Storport Miniport are in Event ID 11 with source "elxstor".
- The Storport Miniport driver parameter LogErrors determines what type of events are logged by the driver; the default setting is "3" which logs only events of a SEVERE nature; the optional setting of "2" logs events of both SEVERE and MALFUNCTION type; the optional setting of "1" logs events of SEVERE, MALFUNCTION and COMMAND type.

Note: For troubleshooting SAN connectivity or device discovery issues, set the LogErrors to 1.

- The Emulex event code is found in byte 0010 and supplementary data is in byte offsets 0011 through 0013.

Additional Event Log Information

The following tables are not comprehensive but do include those codes, which through Emulex's experiences in our support and testing environments, we feel are most likely to show up in SAN environments where problems occur.

ELS/FCP Command Error Status Codes

Internal firmware codes posted by the adapter firmware that explain why a particular ELS or FCP command failed at the FC level.

Table 10: ELS/FCP Command Error Status Codes

Explanation	Code
Remote Stop - Remote port sent an ABTS	0x2
Local Reject - Local Reject error detail	0x3
LS_RJT Received - Remote port sent LS_RJT	0x9
A_RJT Received - Remote port sent BA_RJT	0xA

CT Command Response Codes

Codes that indicate the response to a FC Common Transport protocol command.

Table 11: CT Command Response Codes

Explanation	Code
FC Common Transport Reject	0x8001
FC Common Transport Accept	0x8002

FC-CT Reject Reason Codes

Codes that indicate the reason a CT command was rejected.

Table 12: FC-CT Reject Reason Codes

Explanation	Code
Invalid command code	0x01

Table 12: FC-CT Reject Reason Codes

Explanation	Code
Invalid version level	0x02
Logical busy	0x05
Protocol error	0x07

ELS Command Codes

FC protocol codes that describe what particular Extended Link Services command was sent.

Table 13: ELS Command Codes

Explanation	Code
Link Service Reject (LS_RJT)	0x01
Accept (ACC)	0x02
N_Port Login (PLOGI)	0x03
Fabric Login (FLOGI)	0x04
N_Port Logout (LOGO)	0x05
Process Login (PRLI)	0x20
Process Logout (PRLO)	0x21
Discover F_Port Service Params (FDISC)	0x51
Discover Address (ADISC)	0x52
Register State Change Notify (RSCN)	0x61

Local Reject Status

Codes supplied by the Emulex adapter firmware which indicate why a command was failed by the adapter.

Table 14: Local Reject Status Codes

Explanation	Code
SEQUENCE TIMEOUT - Possible bad cable/link noise	0x02
INVALID RPI - Occurs when link goes down	0x04
NO XRI - Possible host or SAN problem	0x05
TX_DMA FAILED - Possible host system problem	0x0D
RX_DMA FAILED- Possible host system problem	0x0E
ILLEGAL FRAME - Possible bad cable/link noise	0x0F
NO RESOURCES - Port out of exchanges or logins	0x11
LOOP OPEN FAILURE - FC_AL port not responding	0x18

Table 14: Local Reject Status Codes

Explanation	Code
LINK DOWN - Queued cmds returned at link down	0x51A
OUT OF ORDER DATA - Possible bad cable or noise	0x1D

Additional Notes on Selected Error Codes

These are error codes which may be seen more frequently than others or which indicate conditions that you might be able to solve by investigation and correction of problems in the SAN configuration.

Note: Nomenclature of 0x is used as the prefix for the byte code fields because those byte codes are actually hex values.

Node timeout (code 0xAA)

This event code indicates that a particular device has not been found (if the message is logged during device discovery) or that a particular device has been removed from the fabric. If this message is seen, determine if there is something wrong with the connection of that device to the SAN (cables, switches or switch ports, status of the target device itself).

Nameserver Response (code 0x98)

This code is useful in determining if the expected number of targets in a SAN configuration are being presented by the nameserver to the requesting adapter. The number in byte 0x11 is the number of targets returned to the nameserver query made by the adapter - if the number of targets does not match expectations, examine the SAN configuration found in the switch tables and if that information shows targets or devices still missing, check connections between the switch ports and those devices.

Context Allocation Failures

There are a number of event codes for which the interpretation contains the phrase "context allocation failure" - these types of events are referring to the internal memory constructs of the Emulex Storport Miniport driver and as such are intended for Emulex design engineer's information. If a customer encounters such an event, they should contact Emulex support for analysis and determination if that particular event may be an indicator of a failed adapter or of some problem with interaction between the adapter, the Emulex Storport Miniport driver, the host operating system and the host memory.

Note: Context allocation failures are rare.
